Vol. III, No. 2 VERTEBRATA PALASIATICA June, 1959

# ON A NEW NOTHOSAURIA FROM THE LOWER TRIASSIC BEDS OF KWANGSI

YOUNG CHUNG-CHIEN
(*Institute of Vertebrate Paleontology, Academia Sinica*)

## INTRODUCTION

In August 1958, a field party of petroleum inspection has been discovered an interesting marine reptile preserved in a slab of thin bedded greyish impure limestone. This specimen was subsequently sent to the Institute for determination. A preliminary observation of it denotes that it represents a genuine Nothosauria found for the second time in China and is of interest to make a study of it immediately.

I take the pleasure to express my thanks to the authorities of the Bureau of Petroleum for sending the interesting specimen to the Institute of Vertebrate of Paleontology for study and exhibition.

## DESCRIPTION

### Preservation

The whole slab with the fossils was broken into many pieces during the excavation. It was recemented in the laboratory and we failed to determine the proper position of some fragments of bones.

The fossil in question consists of a great part of the trunk represented by ca. 20 dorsal vertebrae mostly with associated ribs and gastralia, five anterior caudal vertebrae and the tolerably preserved left posterior limb. The sacrum is concealed or not preserved and the other posterior limb is only indicated by the anterior part of the femur. For the pelvic girdle, only part of the both pubes was badly preserved. The relative position and the way of preservation are showing in the given sketch and the accompanying plate.

The general condition of the preservation shows that the fossil was originally complete. But unfortunately only a part of it was saved.

The trunk part forms the main portion of the preserved specimen. The gently curved vertebral column shows essentially the oblique ventral side, more of the right side, with the diapophyses of right side mostly visible. Most of the attached ribs on the left side are practically in natural position and not distorted, while those of the left side are much displaced and many of them are lost. Only a few ventral ribs are preserved, apparently most of them were lost.

Unfortunately, the pelvic part is badly damaged, so that the sacrum cannot be clearly traced. Only part of the pubes of the pelvic girdle itself is preserved. At this part of the vertebral column, a sharp twist must be happened, because the column is bent abruptly at a right angle to the right side of the body and the five anterior caudal vertebrae show their

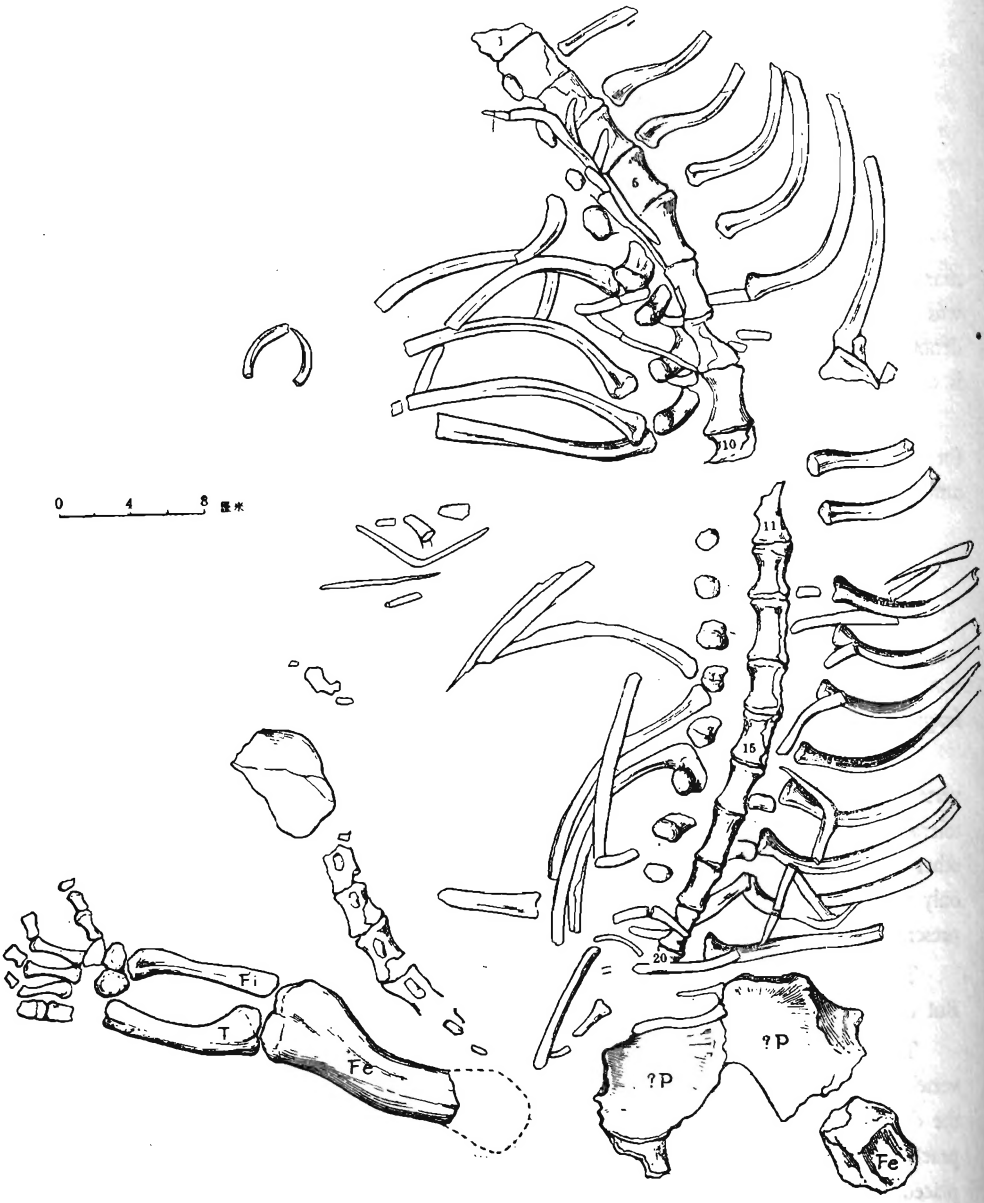


Fig. 1 *Kwangsisaurus orientalis*, gen. et. sp. nov. The preserved specimen in ca. 1/4 nat. size.

dorsal aspect. This twist is apparently responsible for the fact that both the posterior limbs are lying on the left side of the body.

Only the proximal part of the right femur is faintly shown. The left posterior limb is better preserved. The proximal part of the femur is broken, but its outline is indicated on the matrix which enables us to estimate the length of the bone. Both the ulna and the radius are tolerably well preserved. Besides the three tarsal elements the metatarals are complete, with a few proximal phalanges.

## Anatomical Characteristics

**Vertebrae and Ribs** There are ca. 20 presacral vertebrae preserved and thus represents the most of the thoracic and lumbar vertebrae. The first three damaged vertebrae are sub-equal in length and breadth and represent probably the last neck or anterior dorsal vertebrae. The following ones are more or less elongated with considerable constriction. The diapophyses showing at the right side of the body are massive and distally somewhat thickened. The anterior caudal vertebrae are badly preserved, but their broken spina dorsalis is still observable.

All the preserved ribs are single headed and some of them broaden distally. The scattered few gastralia are either straight or bent, the original position of which are indeterminable. Both the relative position of the ribs and the gastralia are showing in the given sketch and photographs.

**Pelvic Girdle** Two doubtful bones represent probably the both pubes. They are shifted laterally from their original position. Although they are damaged, the thickened part for articulation with the femur is recognizable; the constriction above it is less clear. There is no clear trace of the other elements of the pelvic girdle.

**The Posterior Limb** The length of the **femur** can be estimated with certainty. It is a long and slender bone and looks much curved. The ventral side of the distal part is weakly depressed. The **tibia** is considerably curved with the proximal part more expanded. In this way it differs remarkably from the tibia of the other related genera. It is comparatively much longer as compared with the femur (See the proportions below). The **fibula** is a little shorter than the tibia, a feature seems to be peculiar for the present form. It is also a rather slender bone and comparatively straight. The distal end is somewhat broader than the proximal one.

All three elements of the **tarsalia** are present. The **intermedium** is the largest of the three and somewhat sagittally elongated. A weak constriction is observed below the proximal end. The **fibulare** is smaller and is considerably transversally elongated. The third one, **tarsale distale,** is damaged but the broken surface shows that it is even larger than the fibulare. It is also sagittally elongated. The three bones are lying in

their natural position as showing in the given sketch.

The ***metatarsalia*** are complete. They are also slenderly contructed. The Mt. I is the shortest while that of Mt. III is the longest. Mt. I and Mt. V are broader than the other ones.

**Table 1**

Measurements (in mm) and Proportions

Length and posterior basal breadth of the vertebrae

(Preserved vertebrae number counting from the anterior end.) 1, —X? 23; 2, 23×22; 3, 26×21; 4, 26.5×21.5; 5, 28.5×20; 6, 31×18.5; 9, 30×22; 12, 27×22; 13, 32×21; 14, 31×21; 15, 30×19.5; 16, 29×17; 17, 30×16. Length of the caudal vertebrae: 1, 32; 2, 32; 3, 28; 4, 25; 5, 21.

| Femur | Kwangsi form | Paranothosaurus amsteri(1) | Ceresiosaurus calcagnii(1) |
|---|---|---|---|
| Estimated length | 141 | 260 | 60; 77 |
| Distal breadth | 51 | 52; 54 | 10; 12 |
| Minimum breadth | 30 | 29 | 7; 8.5 |
| Tibia | | | |
| Length | 89 | 124; 121 | 32; 43 |
| Proximal breadth | 27 | 41; 37 | 9; 11 |
| Distal breadth | 17 | 40; 39 | 11 |
| Minimum breadth | 11 | 26; 25 | 5; 8.5 |
| Fibula | | | |
| Length | 78 | 127; 125 | 32; 43 |
| Proximal breadth | ?19 | 34; 30 | 8 |
| Distal breadth | 19.5 | 35 | 8; 11 |
| Minimum breadth | 9.5 | 17; 16 | 5; 7 |
| Tarsus | | | |
| Maximum diameter of I (intermedium) | 15.5 | 48 | 10; 13 |
| Minimum diameter of the same | 13 | 35; 37 | 8: 11 |
| Max. diameter of II, (fibulare) | 13 | 38; 37 | 8; 10.5 |
| Min. diameter of the same | 11 | 28 | 7; 10 |
| Max. diameter of III (tarsale distale) | 13 | 23; 24 | 4; 5.5 |
| Min. diameter of the same | 11 | 19; 18 | 4; 5.5 |
| Metatarsus | | | |
| Length of I | 13.5 | 37; 34 | 10; 14 |
| Length of II | 27 | 58; 55 | 15.5; 22.5 |
| Length of III | 30 | 64 | 18; 25.5 |
| Length of IV | 25 | 66; 65 | 17.5; 25.5 |
| Length of V | 18 | 58; 59 | 15.5; 21.5 |

(1) Measurements taken according to Peyer 1931, 1939. The two figures represent those of the left side and the right side respectively.

Total length of femur, tibia, tarsus and the longest metatasus···275.5 (The same of *Paranothosaurus amsteri*, 498 and that of *Ceresiosaurus calcagnii*, 205.)

Proportion between the tibia and the femur, $\frac{89\times100}{141}$ ····· 63.83

The same of *Paranothosaurus amsteri*, $\frac{124\times100}{260}$ ····· 47.59

The same of *Ceresiosaurus calcagnii*, $\frac{43\times100}{77}$ ····· 55.55

Proportion between the longest metatarsus and the tibia, $\frac{30\times100}{89}$ ····· 33.69

The same of *P. amsteri*, $\frac{66\times100}{124}$ ····· 63.70

The same of *C. calcagnii*, $\frac{25.5\times100}{43}$ ····· 59.30

Only the proximal phalanges are present. They are: Mt. I, 2; Mt. II, to Mt. IV, 1 and Mt. V, 2. The phalanges of Mt. I are certainly completely represented while those of the others are greatly missing. The total number of them remains unknown but they are probably about the same as the other related genera.

## Determination and Discussions

It is clear that the present described specimen belongs to the order Nothosauria based on the general features. In size, it takes about an intermediate position between *Paranothosaurus amsteri* and *Ceresiosaurus calcagnii* but much closer to the former. In anatomical characters, our form differs, however, remarkably from the both named genera and other related forms. It is obvious that we have to deal with a new nothosaur in China. I like to propose the name *Kwangsisaurus orientalis*, new genus and new species, with the above described specimen as the type. The diagnosis of this new form may be given below:

Vertebrae of the dorsal region elongated and sharply constricted. Femur relatively short and stout. Tibia long with proximal end more expanded. Foot comparatively short and small.

The long-stretched dorsal vertebrae differ distinctly from the above mentioned two genera for comparison. But the most characteristic feature of the Kwangsi fossil lies on the posterior limb. The shortness of the femur, the slenderness of the lower arm and the extremely short foot indicate that our form is distinctly different from both named genera. The construction of the foot shows that the animal is still able to adapt land life and somewhat primitive in view of the aquatic adaptation.

The only Asiatic nothosaur *Metanothosaurus nipponicus* is much smaller than our form (length of the presacral vertebrae 16.7 and the length of the supposed tibia 50). The vertebrae are short and broad and the tibia ha broader distal end. These facts confirm the idea of Yabe and Shikama that the Japanese form may be related to *Paranothosaurus*.

Since there is no complete posterior limb preserved in this form, it is difficult to compare more closely with the present specimen of China. The available data show that both forms must be distinct from each other.

**Table 2**

The differences of our form compared with *Paranothosaurus* and *Ceresiosaurus*.

| | *Kwangsisaurus* | *Paranothosaurus* | *Ceresiosaurus* |
|---|---|---|---|
| Vertebrae | Long stretched and constricted. | Short and broad. | Short and broad. |
| Femur | Short and broad, rather curved and distally expanded. | Long and slender. | Moderately long. |
| Tibia | Slender with the proximal end expanded and curved. | Both ends subequal in breadth. | Rather short and broad. |
| Fibula | Slender, shorter than tibia. | Longer than tibia. | Equal in length with tibia. |
| Metatarsus | Short. | Long. | Rather long. |

According to the field observation the Kwangsi specimen is derived from the lower Triassic beds. The above described features of the specimen confirms this conclusion. The primitiveness of the posterior limb of the Kwangsi form is in accordance with the rather low level of the stratigraphic position observed in the field.

**Table 3**

The stratigraphic position of the so far known Asiatic nothosaurus and their related forms.

| | Asia | Europe |
|---|---|---|
| Upper Triassic | | |
| Middle Triassic | *Keichousaurus hui* | *Pachyplerosaurus edwardsi*<br>*Paranothosaurus amsteri*<br>*Ceresiosaurus calcagnii* |
| Lower Triassic | *Metanothosaurus nipponcius*<br>*Kwangsisaurus orientalis* | |

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Plate I. *Kwangsisaurus orientalis* gen. et sp. nov. The type specimen in ca. 1/3 nat. size.

Plate II. The same specimen in 1/2 nat. size showing the posterior dorsal vertebrae, anterior caudal vertebrae and the posterior limb.